

INCH-POUND

MIL-PRF-19500/199B
8 July 2003
SUPERSEDING
MIL-S-19500/199A
10 February 1966

PERFORMANCE SPECIFICATION
SEMICONDUCTOR DEVICE, DIODE, SILICON,
FORWARD-VOLTAGE REGULATOR,
TYPE JAN1N816

MIL-PRF-19500/199B is inactive for new design as of 7 June 1999.

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for silicon, forward-voltage regulator, with a nominal forward-voltage drop of 0.64 V dc at 1 mA dc and with the following ratings and characteristics. One level of product assurance is provided for each type of device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1 (DO-7).

1.3 Maximum ratings.

V_r	$V_{RM}(wkg)$	I_F	$I_f(\text{surge})$ 1/120 sec	T_{OP}	T_{STG}
<u>V(pk)</u>	<u>V(pk)</u>	<u>mA dc</u>	<u>MAdc</u>	-65°C to +150°C	-65°C to +175°C
10	6	150	500		

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, DSCC-VAC, P.O. Box 3990, Columbus, OH 43216-5000, by using the addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

FSC 5961

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

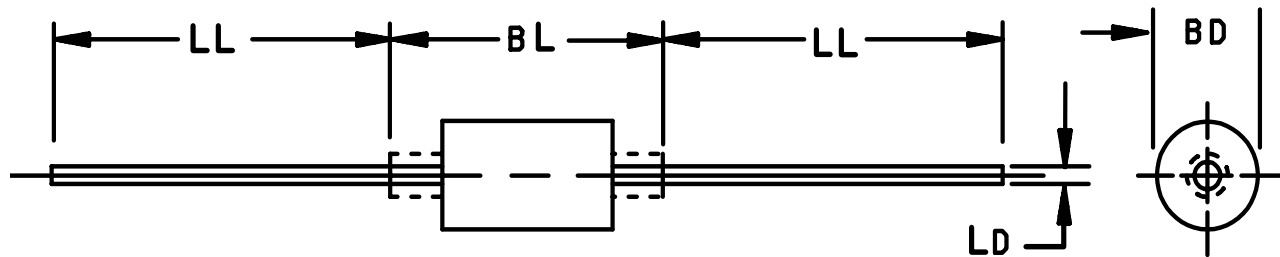
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

DEPARTMENT OF DEFENSE

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Services (DAPS), Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)



Dimensions					Notes
Ltr	Inches		Millimeters		
	Min	Max	Min	Max	
BD	.085	.130	2.16	3.30	3
BL	.230	.300	5.84	7.62	4
LD	.018	.022	0.46	0.56	4
LL	1.000	1.500	25.40	38.10	

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension BD shall be measured at the largest diameter.
4. Dimensions BL and LD include all components of the diode periphery except the sections of the leads over which the diameter is controlled.
5. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.

FIGURE 1. Physical dimensions (DO-7).

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1.

3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.4.2 Diode construction. All devices shall be metallurgically bonded double plug construction in accordance with the requirements of category I, II, or III.

3.5 Marking. Marking shall be in accordance with MIL-PRF-19500.

3.5.1 Polarity. The polarity shall be indicated with a contrasting color band to denote the cathode end. No color coding will be permitted.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in paragraph 1.3 and table I.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

4.3 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500 and table I herein. End-point electrical measurements shall be in accordance with table I, subgroup 2 herein.

4.3.1.1 Thermal impedance Z_{JX} measurements. Thermal impedance Z_{JX} measurements shall be performed in accordance with MIL-STD-750, method 3101.

4.3.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VIb of MIL-PRF-19500. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table I, subgroup 2 herein.

4.3.2.1 Group B inspection, table VIb of MIL-PRF-19500.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
B3	1027	$I_f = 150\text{mA dc}$, $V_{RWM} = 6\text{V (pk)}$ (see 4.4.1).
B5		Not applicable.

4.3.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table VII of MIL-PRF-19500, and as follows. Electrical measurements (end-points) shall be in accordance with the table I, subgroup 2 herein.

<u>Subgroup</u>	<u>Method</u>	<u>Condition</u>
C2	2036	Lead fatigue: Test condition E.
C6	1026	$I_f = 150\text{mA dc}$, $V_{RWM} = 6\text{V (pk)}$ (see 4.4.1).

4.4 Methods of inspection. Methods of inspection shall be as specified in table I, and as follows:

4.4.1 Steady-state operation life. This test may be conducted with a half-sine wave form of the specified peak voltage impressed across the diode in the reverse direction followed by a half-sine wave form of the specified average rectifier current. The forward conduction angle of the rectified current shall not be greater than 180 degrees nor less than 150 degrees; and the power shall be equal to or greater than that of a half-sine wave.

4.4.2 Surge current $I_f(\text{surge})$. The surge current ($I_f(\text{surge}) = 500\text{ mA dc}$) shall be applied in the forward direction and shall be superimposed on the current ($I_O = 150\text{ mA dc}$) a total of ten surges at 1 minute intervals. Each individual surge shall be a square wave pulse of 1/120 second duration or an equivalent one half sine wave with the same effective (rms) current.

4.4.3 Forward recovery voltage and time. Forward recovery time shall be measured as the time interval between zero time and the point where the pulsed has decreased to 110 percent of the steady-state value of V_F when $I_F =$ as specified in table I, subgroup 4. The maximum rise time of the response detector shall be 1 ns.

4.4.4 Pulse measurements. Conditions for pulse measurements shall be specified in section 4 of MIL-STD-750.

TABLE I. Group A inspection.

Inspection <u>1</u> /	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u> Visual and mechanical examination	2071					
<u>Subgroup 2</u> Thermal impedance	3101	See 4.3.1.1	$Z_{\theta JX}$		70	$^{\circ}\text{C/W}$
Forward voltage	4011	$I_F = 1.0 \text{ mA dc}$	V_F	0.576	0.704	V dc
Forward voltage	4011	$I_F = 100 \text{ mA dc}$	V_{F1}		1.0	V dc
Dynamic resistance		$I_F = 1.0 \text{ mA dc};$ $I_{AC} = 0.1 \text{ mA (rms)};$ $f = 60 \text{ cps}$	R		50	ohms
Reverse current at peak reverse voltage	4016	$V_R = 10 \text{ v(pk)}$	I_r		10	$\mu\text{A (pk)}$
Reverse current	4016	$V_R = 6 \text{ V dc}$	I_R		100	nA dc
<u>Subgroup 3</u> High temperature operation:		$T_A = +150^{\circ}\text{C}$				
Reverse current	4016	DC method, $V_R = 6 \text{ Vdc}$,	I_{R2}		10	$\mu\text{A dc}$
Low temperature operation:		$T_A = -55^{\circ}\text{C}$				
Forward voltage	4011	$I_F = 100 \text{ mA (pk)}$ (Pulsed); $t_p = 8.5 \text{ ms (max)}$, duty cycle $\leq 2\%$.	V_{F2}		1.2	V dc
<u>Subgroup 4</u> Surge current	4066	$I_F = 150 \text{ mA dc}; T_A = 25^{\circ}\text{C},$ $I_{FSM} = 500 \text{ ma (pk)}$, ten $1 \mu\text{s}$ surges, 1 surge/minute				
Electrical measurements		See table I, subgroup 2				

1/ For sampling plan see MIL-PRF-19500.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.2.1).
- b. Lead finish (see 3.3.1).
- c. Type designation.
- d. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers' List (QML) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center, Columbus, ATTN: DSCC/VQE, P.O. Box 3990, Columbus, OH 43216-5000.

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
 Army – CR
 Navy - EC
 Air Force – 11
 DLA - CC

Preparing activity:
 DLA - CC

(Project 5961-2823)

Review activities:
 Army - AR, AV, MI, SM
 Navy - AS, MC, OS, SH
 Air Force - 19, 70, 99

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-19500/199B	2. DOCUMENT DATE 8 July 2003
3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, DIODE, SILICON, FORWARD-VOLTAGE REGULATOR, TYPE JAN1N816		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) COMMERCIAL DSN FAX EMAIL	7. DATE SUBMITTED
8. PREPARING ACTIVITY		
a. Point of Contact Alan Barone	b. TELEPHONE Commercial DSN FAX EMAIL 614-692-0510 850-0510 614-692-6939 alan.barone@dla.mil	
c. ADDRESS Defense Supply Center, Columbus ATTN: DSCC-VAC P.O. Box 3990 Columbus, OH 43216-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman, Suite 2533 Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888	